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The Hellenic Manufacturer for Scientific & Industrial Laboratory Solutions

Chryssagis

Supporting the Plant

We simulate the environment you need

About CDR CHRYSSAGIS

63 Years of Experience Three Generations of continuous Improvement

CDR CHRYSSAGIS is a familly-owned company originally established in 1954. In the first years was manufacturing commercial refrigerators exclusively for the Hellenic market.

Since 1988 the company designs and manufactures environment controlled chambers and material testing appliances for scientific, industrial laboratories and horticulture producers under the trademark CDR©. From the base in Athens is leading the Hellenic market and the activity has increased so we export our products in Middle East and Asia.

CDR CHRYSSAGIS is well known for reliability and consistent support of its

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products.The technical knowledge and manufacturing tradition are firmly established by CDR's wide range of specialized products.

All these years, top priority of CDR remains to deliver the highest possible quality in her products for extremely competitive prices.

Today CDR products are marketed by a net of well established and skilled distributors who are able to give excellent support regarding both sales and

ATHENS HELLAS

Continuing research and improvements may result in specification changes at any time without written notice.

Reach-in
Plant Growth Chambers

- **Accurate & Uniform Conditioning**
- **Available in three standard sizes & at any other size by request**
- **Advanced control system with VNC server capabilities**
- **Highly expandable system with a large number of options**

Plant Growth Chambers for the budget of every laboratory

CDR CHRYSSAGIS is a Hellenic leader in the design, manufacture, installation and servicing of environment controlled chambers in all aspects of plant science. Our combination of high quality components, design and manufacturing expertise enables us to offer outstanding control performance, reliability, reassurance of the integrity of temperature, humidity and controlled atmosphere testing results.

Developed through our 27 years of experience, this generation of Reach-in Plant Growth chambers represents leading technology. CDR's GRW reach-in series-4 has been specially developed to meet every test requirement in research at universities, government institutions and corporations.
GRW Series-4 model's further consideration of all aspects of plant growth testing process have been incorporated into the design. These reach-in chambers provide ideal solution at various volumes and available growth heights with exceptional specification at very competitive prices.

GRW Series-4 chambers are divided in different categories expressed with Codes based on their light bank position, air flow direction, available height for plant growth and supporting applications.

All CDR products carry CE marks and are covered by a comprehensive warranty. Since some research projects demand different specifications, we understand that your chamber's requirements may not fit into our standard products, so please contact us for specific details and options on custom orders.

Superstructure details

Reach-in GRW series-4 test chamber's interior and exterior walls are made of stainless steel (SS 304). Working room's walls are painted in white enamel for better light distribution. Their efficient but thin insulation helps to minimize the use of your laboratory space and ensures low power consumption.
This injected foamed polyurethane insulation with overall wall thickness of 60mm and density of 45Kgr/m3, is fireproof and environment friendly (CFC free). Internal chamber has rounded corners for easy cleaning and a bottom section able to collect liquids or particles that are accidentally spilt.

Wide door opening(s) facilitate easy loading and unloading of pots and plants. A magnetic gasket provides a tight seal to door frame. All models are equipped with an internal securit glass door that ensures easy observation without disturbing the internal atmosphere and key lock(s) to preclude access by unauthorized personnel. Chambers equipped with light canopy on the front door have double insulated glass doors and cover.

Special attention has been given so the working space is practical and easy adjustable to user's needs. According to the experiment the user may increase or decrease stainless steel shelves area by adding or removing shelves. Shelves have supports that allow a choice of vertical positioning at 12mm intervals. Models with independent light fixtures on every shelf are also available for Arabidopsis research.
All chambers are equipped with 4 caster assemblies (2 with brakes) for easy moving around in your laboratory.

CDR is manufacturing Plant Growth Chamber specifically designed for various plant sizes and optimized for different applications (e.g. plant growth, Arabidopsis & Algae, Insect rearing, dew formation uniquely designed for plant pathology) . Special codes express their light canopy position, barriered or non barriered light canopies, compatibility according to plant growth height, light spectrum (type of lamps) and air flow direction.

Innovative conditioning of the growth space

All GRW chambers are equipped with an air handling that incorporates the refrigeration unit, recirculating fan(s), the humidification system, air ventilation filter and optionally the dehumidification system, the CO2 injection system and the CO2 scrubber.
A big advantage is that refrigeration system is equipped with a <<Tropical type>> air cooled condensing unit that is located in the machine's compartment. Tropical condensing units are capable to work in ambient condition up to 46º C, which is very important in some climate zones. Optionally water cooled condensing units are also available as well as split condensing units were the condenser can be installed remotely outdoors in separate weather protection housing. Both water cooled and split type condensing unit options prevent heat dissipation at the installation laboratory.
Standard models have energy efficient, self-contained refrigeration compressors. They are loaded with environmental friendly (CFC free) refrigerant. Refrigeration system includes hot gas bypass cycle for high temperature stability and continuous compressor operation. This guarantees economy, reliability and quiet operation. The evaporator coir (heat exchanger) is protected by a phenolic coating that is resistive to corrosion and to growth of fungus.

A wide range of centrifugal and optionally electronic atomizing humidification systems are available. These atomizing humidification systems produce very small water droplets (<7μm) which evaporate immediately so they are not transferred inside the growth area. The right type is selected based on application, water quality, size of the chamber and customer request in order to assure reliability and accuracy.
Optionally chambers may be equipped with a very capable dehumidification system that is based on a stand-alone refrigeration unit.
Every refrigeration unit is equipped with refrigerant high/low pressures safety devices, overcurrent safety device and optionally (high horse power compressors only) with oil pressure safety device.

Special designed Air flow patterns

Precisely designed and manufactured air plenums are introducing pre-conditioned, nonstop recirculated air from the air handling unit. CDR designs air flow patterns that always are directed through the shelves assuring consistent air flow for better uniformity with faster temperature recovery from door openings.

Available are models with vertical and horizontal air flow. Although air flow velocity is specifically targeted at plant growth (0.2m/sec) optionally CDR provides adjustable air speed.
In models with vertical air flow a special perforated floor delivers and distributes uniformly the conditioning air with an upward airflow pattern.
Arabidopsis, Incubation and all chambers with lights mounted in every shelf use a perforated rear or side walls plenum which discharges the air horizontally. This ensures maximum condition uniformity in view of the use of flats or similar research vessels.

Perforated bottom plenums for vertical air flow distribution

Ventilation

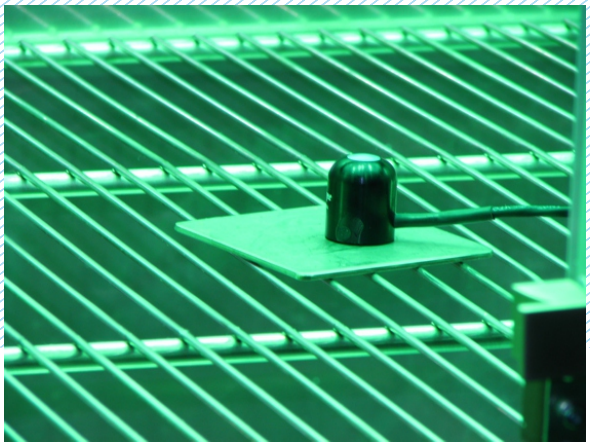
Chamber' s ventilation system has a manually adjustable dumper. It provides maximum 48 l/s (100cfm) constant 3-4x air changes per hour. Fresh air that is passing through a washable dust filter is introduced behind the heat exchanger in order to be homogenized with the recirculated air before entering the growth space. This prevents the disturbance of the environment.

Carbon Dioxide Enrichment (optional)

This microcomputer driven CO2 control system is developed to maintain CO2 concentration between 50 and 10 000 μmol mol−1. Air samples are directed with a pump to an infrared gas analyzer and pure CO2 is injected under PID control. CO2 concentration is displayed on the screen and logged on the onboard data logger.

Measure PAR Light in your Growth Chamber (optional)

Increasing the amount of photosynthetically active radiation (PAR) - light with a wavelength between 400 to 700 nm - increases plant photosynthesis. The optimal light intensity varies with the growth stage of the plant; plants at a vegetative or reproductive stage require much more light than seeds or cuttings. To monitor the amount of PAR available to your plants and to get to know when the time to replace your chamber's lamps is, CDR provides the optional on board PAR measuring system. This PAR measuring system includes a precise Quantum Sensor which is mounted with a 2 meter cable inside the growth space in order to be able to select the point of measurement. PAR irradiation intensity is displayed on the screen and logged on the onboard data logger.



Lighting

To meet client's unique needs CDR is providing a number of lighting solutions including models with barriered or non-barriered light banks. According to light bank position, to the desired light spectrum and intensity and the separation or not of the light canopy from the growth space CDR has the following models:

BARRIERED OR NON BARRIERED LIGHT CANOPIES

TBLIN/	These chambers have light canopies inside the growing space without separating barrier.
TBLOU/	These chambers have barriered and ventilated light bank.

Lighting

LIGHT CANOPY POSITION

S/ Lights at both SIDES of the chamber. In this configuration that is for small and medium plant sizes, the chamber operates as multi-tier configuration with medium or high light intensity and vertical airflow. SD chamber provides an exceptional growth area-to-footprint ratio.

D/ Lights on chamber's DOOR. This configuration that is for small plant sizes, is available for dew formation growth chambers that are uniquely designed for plant pathology. In this chamber plants are tested in a high (100% RH) humidity, or 'saturated' or 'mist', environment. Dew chambers operate as multi-tier configuration with low light intensity and vertical airflow.

T/ Lights at the TOP of the chamber. In this configuration that is available for medium and big plant sizes, the chamber operates as a single-tier highlight growth chamber with a counterbalanced light canopy and upward airflow.

SH/ Lights at the TOP of every shelf. In this configuration that is for small plant sizes, the chamber operates as multi-tier configuration with low or medium light intensity and horizontal airflow. This option is available with LED lights.

SB/ Lights at the SIDES & at the BACK of the working space. In this configuration, the chamber operates either as a single-tier highlight growth chamber with a counterbalanced light canopy and upward airflow or as multi-tier configuration with medium light intensity and vertical airflow. The configuration can be used with any plant size.

BT/ Lights at the BACK & at the TOP of the working space. In this configuration, the chamber operates either as a single-tier highlight growth chamber with a counterbalanced light canopy and upward airflow or as multi-tier configuration with medium light intensity and vertical airflow. The configuration can be used with any plant size.

BTD/ Lights at the BACK, the TOP and on the DOOR . In this configuration, the chamber operates either as a single-tier highlight growth chamber with a counterbalanced light canopy and upward airflow or as multi-tier configuration with medium light intensity and horizontal airflow. The configuration can be used with any plant size.

SD/ Lights at the SIDES & on the DOOR of the working space. In this configuration that is for small and medium plant sizes, the chamber operates as multi-tier configuration with medium or high light intensity and vertical airflow. SD chamber provides an exceptional growth area-to-footprint ratio.

LIGHT SPECTRUM

FLIN/ Mixture of High Output (HO) cool-white or warm-white fluorescent & incandescent (or Halogen) lamps. Fluorescent lamps are powered with electronic ballasts. Standard system for all entomology chambers.

FLH/ High Output (HO) cool-white or warm-white Fluorescent lamps powered with electronic ballasts.

FLHd/ Dimmable High frequency cool-white or warm-white fluorescent lamps (control from 5 to 100% in 1% increments). Fluorescent lamps are powered with high frequency electronic ballasts.

HQI/ Metal Halide lamps.

LED/ Scientists and facility managers are integrating LEDs to meet specific research requirements and to reduce the operational cost of their plant growth chambers. The LED lighting models are equipped with LED canopies with standard preselected spectrum that cannot be modified (Page 18 for details). CDR in cooperation with Philips and Valoya lighting manufacturers can provide the right spectrum for your application.

LEDd/ Scientists and facility managers are integrating LEDs to meet specific research requirements and to reduce the operational cost of their plant growth chambers. The LED lighting models are equipped with LED canopies with adjustable spectrum (Page 18 for details). With this Dimmable LED lighting system user can adjust the light spectrum based on his application requirements. (Page 18 for details)

FLHd/LEDd Mixture of fluorescent & LED lights (RED & FarRED) individually adjusted within program's steps (in +/- 1% increments).

Notes

1. When a chamber is ordered with a dimming lighting system, programmable adjustment of light intensity is possible as low as 5% with fluorescent, 25% with Metal Halide, 30% with High Pressure Sodium and 40% with Ceramic Metal Halide to maximum intensity.
2. CDR is cooperating with Philips and Valoya as they are the best manufacturers in LED Grow lights. Philips and Valoya's LED light wide spectra offer the best possible light for plants in an energy efficient way. Their standard spectra are designed to optimize growth of a variety of plants in different applications. In addition to photosynthesis, their spectra give valuable information to plants about their environment, allowing control of plant morphology and physiological traits. Optionally in cooperation with Philips and Valoya CDR provides special <<light recipes>> that suit better to your specific research and facility requirements.

VALOYA LED LIGHTS

GRW CMP4 The next Generation Control with expanded data access

The GRW CMP4 control is a member of CDR's new CMP series control system and was developed to provide simplicity and control performance. It is available for use on CDR's new GRW Walk-in and Reach-in stability test chambers.

Monitoring, controlling and alarming are based on simple pull down menu logic using a touch screen with aesthetically pleasing and easy to read graphic interface.

Chambers control temperature, relative humidity, light photoperiod, light intensity in up to 10 step-levels or electronically dimmable from 10-100%, irrigation and optionally CO2 concentration, PAR light measurement & UV lamp sterilization system. All parameter's set points and actual conditions are displayed with large characters for easy viewing. CMP4 is based on a robust, industrial grade PLC platform that consolidates various components into a single integrated unit. Every unit is accompanied by a user selectable size HMI of 7" or 10". Our control system provides full PID mode control for temperature & relative humidity that assures stability. Two level code protected access, permit authorized users to easily monitory, adjust set points, control alarm parameters, view alarm events history, messages and other key data.

CONTROL KEY FEATURES

- 7" (1024x600, 1MB RAM) or optionally 10.1" (1024x600) color touch-screen, with 32 bits RISC Cortex-A8 600MHz processor and graphical interface with pulldown menus.
- Two level or optionally multilevel password security for authorized users.
- User selectable screen menu's language. As standard between Greek, English, French, Turkish and any other language upon request.
- Real time clock for time stamp of events and alarms with two years battery backup.
- Multi point programming with 24 steps per day program capability for every working parameter. CMP4 has a memory for 48 daily programs with user selectable names.
- Full PID control for temperature and relative humidity.
- Light intensity in up to 10 step-levels or dimmable from 10-100% (Fluorescent lamps) & 0-100% (LED lamps).
- Lamp life-time counter with warning screen message that appears when lamps should be changed.
- Audible, visual alarms and alarm logs for temperature, relative humidity and every faulty condition. Alarm logs records are time stamped both when limits are exceeded and corrected (reset).
- Alarm notification system that sends email and/or text phone messages and/or (PSTN /GSM) voice messages in the event of a chamber alarm.
- Auto recover of chamber after power-cut with refrigerant compressor adjustable restart delay for protection purposes.
- Self-diagnostic warnings and alarms for the following faulty conditions with audible alarm and visual messages:
  - a) Temperature & rH% out of limit. High and low limits are user selectable.
  - b) Refrigerant high & low side pressures out of limit.
  - c) Refrigeration oil pressure out of limit.
  - d) Over current protection monitor for refrigeration compressor(s) & refrigeration evaporator fan.
  - e) Power supply voltage cut out or phase of limit.
  - f) Humidification system out of water.
  - g) Burnout temperature & relative humidity sensor(s).
  - h) Deviation between control system's temperature sensors.
  - i) Chamber's door left open.
- Ethernet connection as standard and Wi-Fi connection optionally.
- Remote secure access using VNC server (included) which allows to be remotely monitored from a number of devices (laptops, desktop PCs, tablets, and cell phones.
- Download collected data from the build-in data logger with FTP through Ethernet (or optional Wi-Fi) connection.
- **Integrated data logging facility for temperature, relative humidity, PAR measurement, Co2 measurement. Data in CSV format are exportable for processing with Excel and other spreadsheet applications with a USB stick or via FTP download through Ethernet connection. Viewing archived data appears on thel LCD screen in list and graphic format. Access data-log file while continuing to log current data without disruption. Program sampling rate is adjustable by the user.**

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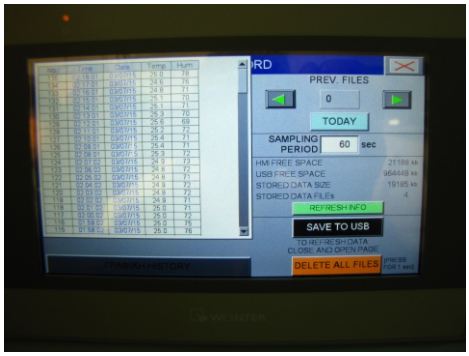
Reach-in GRW & GRWi Series Specifications

	GRW-500 CMP4	GRW-700 CMP4	GRW-1000 CMP4	GRW-1500 CMP4
1. Internal Volume	498 Ltr.	670 Ltr.	1020 Ltr.	1020 Ltr.
2. Number of shelves	1 to 5 (height adjustable in 15mm increments)			
3. Shelf dimensions (mm) / total growth height **	610 x 614mm/1300mm	1050 x 710mm / 1300mm	1320 x 614mm / 1300mm	1837 x 614mm / 1300mm
4. Standard temperature range	+4 to +45 °C (Please check ordering codes for alternative ranges)			
5. Temperature resolution / selection	0,1° C / 0,1° C			
6. Temperature accuracy / stability	0,1° C / +/-0,5° C (other upon request)			
7. Temperature uniformity	+/-0,5° C			
8. Standard relative humidity range	From environment up to up to 95% (without dehumidifier)			
9. Relative humidity range with dehumidifier	>35 up to up to 95% (limited by +4 C dew point)			
10. Relative humidity resolution / selection	1 %			
11. Relative humidity accuracy / stability	+/-2 RH% / +/-3 RH% Standard (other upon request)			
12. Relative humidity uniformity	+/- 2 RH%			
13. Light max intensity	From 416 up to 1330 μmol/m2/sec (irradiation level varies from lamp types and light bank position. Please check ordering codes)			
14. Light spectrum / Dimmable light system	Yes optionally (Selectable upon your order please check ordering codes)			
15. Light bank position	Selectable upon your order (please check ordering codes)			
16. PAR Light measurement /control	Optional (please check ordering codes)			
17. Humidification system	Centrifugal Atomizer (other available please check ordering codes)			
18. CO2 control system (optionally)	0 to 10.000ppm (other ranges upon request)			
19. Irrigation system	Yes (optionally)			
20. Data logger /	Yes (as standard)			
21. Central management software	Scada based software for Ethernet connected PC (optional)/ Alarms with E-mail & optionally with SMS			
22. Power supply	230 +/-10% / 1 Ph / 50Hz (other upon request)			400 +/-10% / 3 Ph / 50Hz (other upon request)

** In multi tier equipped chambers max working height is divided according to the number of layers.



Additional Data for
Entomology Plant Growth Chambers

- **Flicker free lighting**
- **Special humidification system**
- **Advanced control system with VNC server capabilities**
- **Expandable systems with a large number of options**

Plant Growth Chambers for insect rearing

CDR CHRYSSAGIS provides entomological research chambers specially designed for studying drosophila, bees & any other insects within a controllable environment. These chambers are comprehensively engineered systems, providing precise control of all wide range of environmental climate conditions.

Many standard features of the GRW series plant growth chambers are incorporated in the design of these chambers, but GRWi series have some special and important features:

First and most important is the high frequency fluorescent lighting system. Insects may be affected by “the stroboscopic effect” due to the 50Hz power's supply on the common fluorescent, incandescent, metal halide or high pressure sodium lamps. With high frequency lamps or with non-flickering lamps the effect is avoided. All chambers are available in two lighting versions. The high light output version (HOL) for studies with insects living on plants and the low light output versions (LOL) for studies with insects in cages or in Petri Dishes.

Second is the air filtration system. The special carbon filtration system built in the chamber's airflow controls odour emissions from insects.

Third is the piezo-electronic humidification system which is an atomizing system that produces very fine water droplets (1-3 micron). This system in conjunction with chamber's dehumidification system allows high precision control of the relative humidity.

Fourth is the UV lamp base disinfection system that is capable to “clean” the working space within hours. This UV radiation system is programmable from the main control system. It is activating a warning light on the panel and a warning message on chamber's screen for users safety.

All chambers come standard with an internal second glass door for convenient sample viewing. The carefully designed airflow system generates evenly distributed airflow across all shelf locations.

OPTIONAL FEATURES

SUPERSCTRUCTURE OPTIONS

- **Auto Watering System**
  Hose bib connection controlled by programmable solenoid.
- **Controller UPS.**
  Surge protection and uninterrupted power supply, on controller only, for continuous operation of the controller during power interruptions.
- **Extended Growth Height** (models /HEXT)
  Extended growth heights for GRW-1000CMP4 & GRW-1500CMP4 (Dimensions on page 14).

LIGHT CANOPY OPTIONS

- Water-Cooled Lamp Loft
- Lamp heat removed by a dedicated water cooling coil.

CONDITIONING SYSTEM's OPTIONS

- **Circulation Fan Speed Control**
  Programmable or manual fan speed control on conditioning unit, from 50% to maximum.
- **Low Temperature Operation**
  Enables the chamber to be operated with lights ON to +2°C (No fresh air below 4°C.) A defrost cycle will occur resulting in a temperature increase (spike) for temperatures set below +8°C lights ON/OFF.
- **Ultra-Low Temperature Operation**
  Enables the chamber to be operated with lights ON to -10°C (No fresh air below 4°C.) A defrost cycle will occur resulting in a temperature increase (spike) for temperatures set below +8°C lights ON/OFF.
- **Sequential Defrost**
  Multiple cooling coils with a sequenced defrost cycle to eliminate the temperature spike experienced with the standard defrost method.
- **Outdoor Air-Cooled Condensing Unit**
  Containing condenser, compressor, receiver, suction accumulator, control and pressure regulating valves and electrical disconnect.
- **Water-Cooled Condensing Unit**
  Cabinet is supplied with a water-cooled condensing unit with hot gas bypass system for continuous compressor operation, extended compressor life and close temperature control.
- **Chilled Water/Glycol Designed Heating or Cooling**
  Cooling system designed to work with a central chiller refrigeration system.

HUMIDITY CONTROL OPTIONS

- **Bypass Dehumidification**
  A precisely controlled volume of chamber air bypasses the heat exchanger by means of a proportionally controlled air damper.
- **Ultrasonic Humidification (as standard for Entomological chambers)**
  Uses an ultrasonic frequency to turn water into an airborne mist that is forced out into the air to raise humidity.

CO_2 CONTROL OPTIONS

- **CO_2 Additive Control**
  package includes gas analyzer, CO regulator (NA only), control valve and injection system. CO tank not included.
- **CO_2Additive Back Pack**
  Portable system is mounted on the side of the chamber as a standalone device complete with its own **CO_2** process controller.
- **CO_2 Scrubber**
  Allows for controlling CO concentration **levels below resultant conditions. Stand-alone device (floor or roof mounted).**

Additional Data for
Dew Formation Plant Growth Chambers

- **Construction with stainless steel SS316**
- **Special humidification system**
- **Advanced control system with VNC server capabilities**
- **Expandable systems with a large number of options**

Plant Growth Chambers for Pathology research studies.

CDR CHRYSSAGIS designed the GRWwt series research chambers especially for plant Pathologist's research work. Normal plant growth chambers are not able to simulate the ideal environment for the development of fungal diseases.

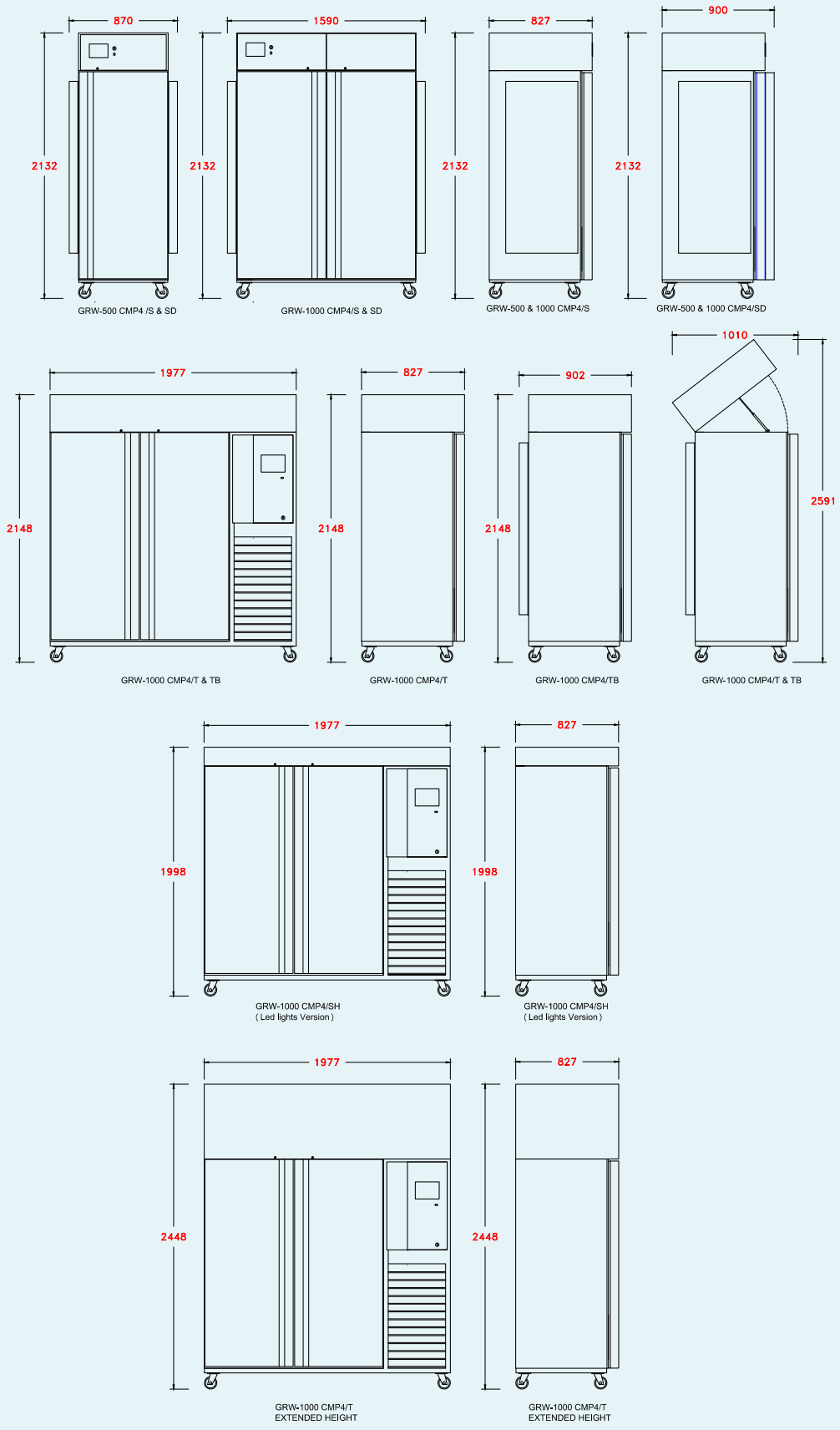
This is because only high air humidity promotes the development of fungal diseases. Fungal spores, for instance of dreaded botrytis, may lead to infection under certain conditions. The spores themselves contain very little water, and need to absorb water from the environment for germination. It is likely that Relative humidity is 100% for the best results and CDR's dew formation chambers are able to reproduce such an environment.

The interior of the chambers is constructed of special stainless steel (SS 316) that will withstand chemical cleaning and disinfecting. Temperature is controlled with special wall-like cooling plates without fans for avoiding spreading the spores. The ceiling is inclined to prohibit drops of water from settling on plants on the top shelf. Dew formation chambers come standard with an internal second glass door for convenient sample viewing.

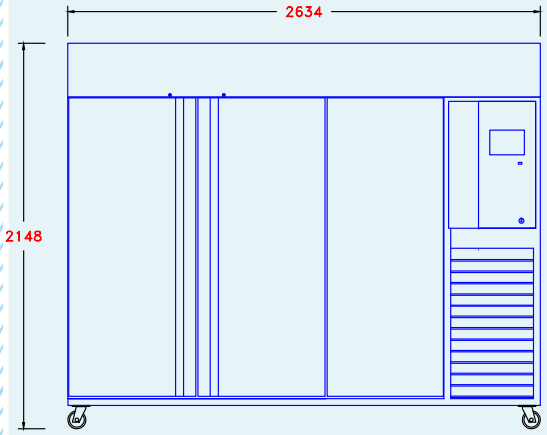
Microprocessor-based PID controls provide precise temperature & humidity control. Chamber Is equipped with a piezo-electronic humidification system. This atomizing humidification system produces very fine water droplets (1-3 micron) that is saturating environment with precision.

CDR GRWwt series chambers are equipped with a UV lamp base disinfection system that is supporting the cleaning of the working space along with the chemical cleaning. This UV radiation system is programmable from the main control system. It is activating a warning light on the panel and a warning message on chamber's screen for user's safety.

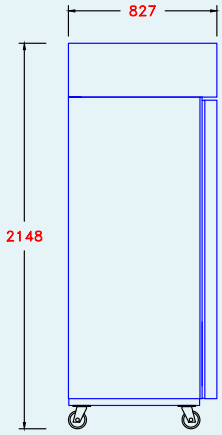
Reach-in GRW-500 & 1000 Series Dimension



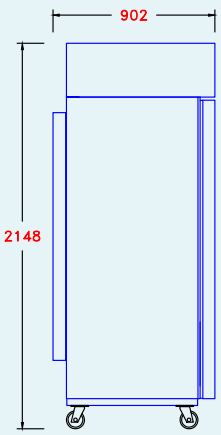
Reach-in GRW-1500 Series Dimension



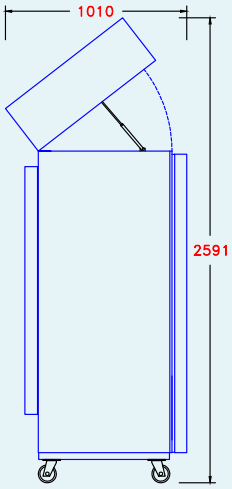
GRW-1500 CMP4/T & TB



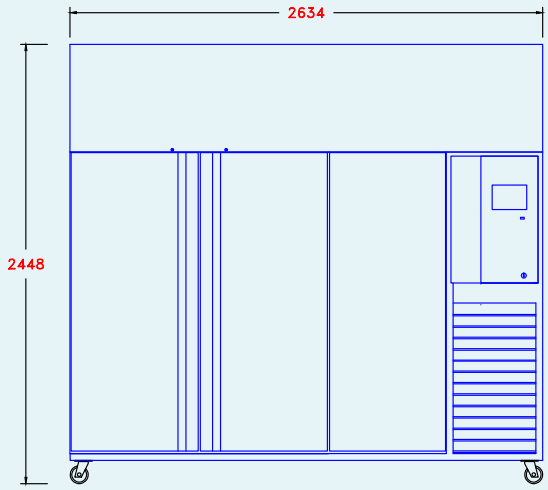
GRW-1500 CMP4/T



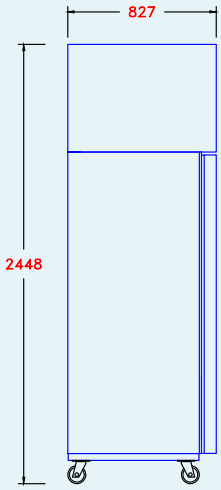
GRW-1500 CMP4/TB



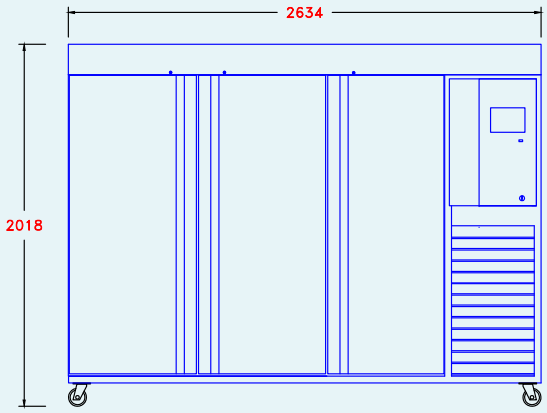
GRW-1500 CMP4/T & TB



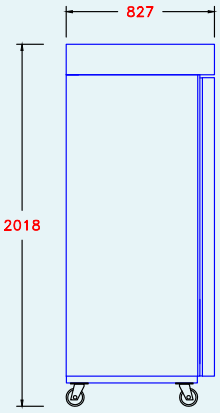
GRW-1500 CMP4/T
EXTENED HEIGHT



GRW-1500 CMP4/T
EXTENED HEIGHT

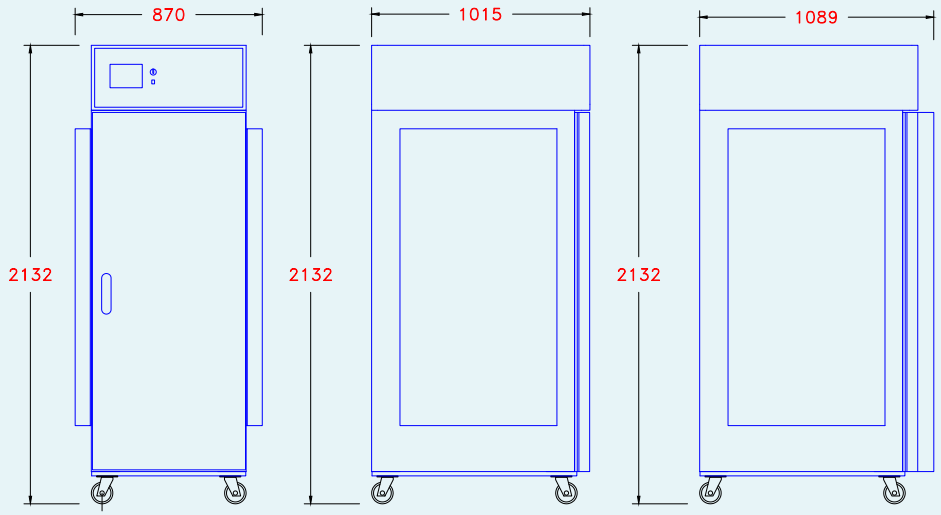


GRW-1500 CMP4/SH
(Led lights - Three Door Version)



GRW-1500 CMP4/SH
(Led lights - Three Door Version)

Reach-in GRW-700 Series Dimension



GRW-700U CMP4/S
GRW-700U CMP4/SD

GRW-700U CMP4/S

GRW-700U CMP4/SD

NOTES

- Specifications are based on nominal voltages in ambients of 22 °C to 25 °C.
- Atomizing humidifiers must be supplied with clean water to the following specification: pH = 7.0 ± 0.5, filtration <2 microns (0.00008 in) and resistivity between 0.5 and 1.0 Meg Ohms. CDR can optionally supply the customer with an on line water deionizing system.
- **Every chamber's ordering code describes the optional equipment of the specific order.**

CONTROL OPTIONS

- WIFI connection to portable or other appliances (optional) IEEE 802.11 b/g/n, 802.11b: max 19.76 dBm, 802.11g: max 14.07 dBm, 802.11n: max 15.41 dBm.
- SCADA central management software for multi chamber support and on line control.
- Multi-level password for accessing the control system.

GENERAL OPTIONS

- Double glazed insulating viewing window with cover, mounted on chamber's doors. Observing window when ordered is replacing the second internal glass door.
- Electrical sockets (230V/16Amps , Ip65).
- User selectable (uppon the order) atomizing humidification system. Available are two options: centrifugal atomizing or multi head ultrasonic atomizing systems.
- Stainless Steel drain pan for condensated water.
- Low Profile Automatic Condensate Water Removal Pump
- Automatic deionizers for humidification system's water supply.

LED light solutions

CDR introduces Valoya LED Grow Lights

Introduction

As CDR CHRYSSAGIS is a Greek distributor of Valoya, is equipping all CDR research plant growth chambers with Valoya LED lights. Valoya is internationally well known for providing preconfigured LED lighting options or customized solutions to suit specific research requirements. Valoya is one of the leading companies in LED light. It focuses on plant Biology research and finding the best possible spectra for optimal plant development.

Valoya Spectra

Valoya's wide spectra offer on of the best possible light for plants in an energy efficient way. Valoya's wide spectra are designed to optimize growth of varying plants in different applications. In addition to photosynthesis, LED light spectra give valuable information to plants about their environment, allowing control of plant morphology and physiological traits.

AP67	Vegetative and strong generative growth
AP673L	Strong vegetative growth
G2	Enhancing vernalization process, flowering & elongation
NS1 / NS12	Sun-like wide spectrum for research and biotech
Valoya Canna+	Optimized growth for consistent yields and cannabinoid expressions in the cannabis plant.

Spectrum type: Wide band. US patent no: 8549787, 8850743, SG patent no: 178825 and international counterparts Worldwide patent pending.

		AP67	AP673L	G2	NS1 / NS12
Ultraviolet	< 400 nm	0 %	0 %	0 %	1% / 0,5%
Blue	400-500 nm	14 %	12 %	8 %	20% / 21%
Green	500-600 nm	16 %	19 %	2 %	39% / 38%
Red	600-700 nm	53 %	61 %	65 %	35% / 35%
Far-red	700-800 nm	17 %	8 %	25 %	5% / 6%
PAR	400-700 nm	83 %	92 %	75 %	94% / 94%
CCT	Kelvin	2500	2000	Not Applicable	4800 / 5000
CRI		70	60	Not Applicable	90 / 91
B:G Ratio		1,2	1,8	25,9	0,7 / 0,6
R:FR Ratio		3,3	5,5	3,1	10,4 / 4,6

Typical values presented in the table.There may be some variation between the spectra in different fixture models due to a disparity in the LED layout.

Application guide

Valoya luminaires are designed to fit spectra in use. Through conducting more than 500 trials they have collected data on optimal light intensities in each growth phase for most commonly cultivated plants worldwide. CDR advise customers based on Valoya experience on the spectrum and luminaire selection for their particular application.

	STANDARD SPECTRA					CUSTOMIZED SPECTRA*		
	AP67	AP673L	G2	NS1	NS12	G1	G13	FR
L-Series	●	●	●		●			
C-Series	●	●			●			
BX-Series	●	●	●	●				●
BL-Series	●	●		●		●	●	
RX-Series	●	●		●		●	●	

Typical Spectrum Applications

	AP67	AP673L	G2	NS1 / NS12
Vegetative growth	◖	●		●
Flowering	●		●	
Vernalization			●	
Tissue culture	●	●		◖
Rooting			●	
Propagation	◖	●		◖

● Excellent fit ◖ Good fit

Typical Luminaire Applications

	L-Series	C-Series	BX-Series	BL-Series	RX-Series
Tissue Culture	●	●			
Vertical Farming	●	●	◖		
Greenhouses			◖	●	●
Rooms and Chambers	●	●	●	◖	◖
HPS Hybrid			●	●	●

● Excellent fit ◖ Good fit

Valoya LED luminaire short description

L- Series

The T8 form factor allows the L-series products to be installed in fluorescent tube fixtures without modification (fixtures with magnetic ballast). Other installation options are cost effective, easy to install end-caps with Ip64.

TYPICAL APPLICATIONS: Vertical farming, tissue culture, growth chambers.
LIGHT INTENSITY IN TYPICAL APPLICATIONS: 20-250µmol/m2/s
DISTANCE FROM THE PLANTS: < 0,5 m (20")
LIGHT EFFICACY(380 - 820 nm): Up to 2,1 µmol/W (spectrum dependent)
LIGHT INTENSITY DECAY: Max 10% at 36 000 h. Typical usage 50 000 h
AMBIENT OPERATING TEMPERATURE: -10 ˚C – +40 ˚C (14 ˚F – 104 ˚F)

C- Series

The C-series is ideal for growth rooms and other demanding applications where high intensity lighting is needed. These luminaires are ultra slim and lightweight which makes them easy to install even in places with very limited space. The bar shaped form factor minimizes shadow effect and makes it suitable for various vertical farming solutions.

TYPICAL APPLICATIONS: Growth rooms, vertical farms.
LIGHT INTENSITY IN TYPICAL APPLICATIONS: 50 ~ 400 µmol/m2/s
DISTANCE FROM THE PLANTS: 0,1 - 1,5 m (4 - 59")
LIGHT EFFICACY(380 - 820 nm): Up to 1,8 µmol/W (spectrum dependent)
LIGHT INTENSITY DECAY: Max 10% at 36 000 h. Typical usage 50 000 h
AMBIENT OPERATING TEMPERATURE: 0 ˚C – 30 ˚C (32 ˚F – 86 ˚F)

BX- Series

BX-Series is the new generation of Valoya's bestseller, the B-Series. Light intensity of up to 2,4 µmol/W comes in slim, light, humidity and impact resistant bar shaped luminaires. Applications demanding high light intensity with absolute light uniformity are what BX-Series was designed for.

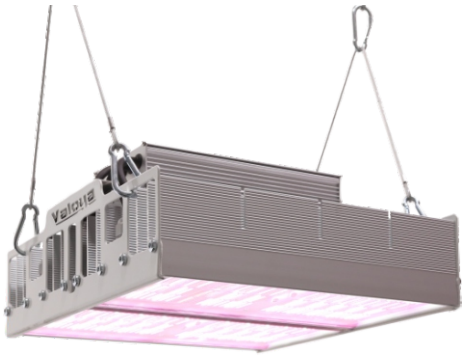
TYPICAL APPLICATIONS: High intensity lighting, growth rooms, multilayer.
LIGHT INTENSITY IN TYPICAL APPLICATIONS: 200 ~ 1000 µmol/m2/s
DISTANCE FROM THE PLANTS: 0,1 - 4,0 m (4" - 13.1')
LIGHT EFFICACY(380 - 820 nm): Up to 2,4 µmol/W (spectrum dependent)
LIGHT INTENSITY DECAY: Max 10% at 36 000 h. Typical usage 50 000 h
AMBIENT OPERATING TEMPERATURE: 0 ˚C – 40 ˚C (32 ˚F – 104 ˚F)

BL- Series

BL-Series combines the high intensity and durability of the BX-Series with the chainability feature allowing up to 16 luminaires to be connected to a single mains input. The LED driver is internal meaning less cables and a simple installation. The BL-Series is ideal for high light intensity

TYPICAL APPLICATIONS: High intensity lighting, greenhouses, growth rooms
LIGHT INTENSITY IN TYPICAL APPLICATIONS: 100 ~ 800 µmol/m2/s
DISTANCE FROM THE PLANTS: 0,1 - 4,0 m (4" - 13.1')
LIGHT EFFICACY(380 - 820 nm): Up to 2,1 µmol/W (spectrum dependent)
LIGHT INTENSITY DECAY: Max 10% at 36 000 h. Typical usage 50 000 h
AMBIENT OPERATING TEMPERATURE: 0 ˚C – 35 ˚C (32 ˚F – 95 ˚F)

RX- Series



The RX-series form factor resembles traditional HID lighting and offers an easy to install option for one-to-one replacement of HID lights. RX-series lights are thus ideal for a step by step investment in LEDs by replacing part of HID lights with more energy efficient Valoya wide spectrum LED lights. A highly durable fixture due to all aluminium build, high IP and passive cooling.

TYPICAL APPLICATIONS: High intensity lighting, HID replacement
LIGHT INTENSITY IN TYPICAL APPLICATIONS: 100 ~ 1000 µmol/m2/s
DISTANCE FROM THE PLANTS: 0,5 - 4,0 m (20" - 13.1')
LIGHT EFFICACY(380 - 820 nm): Up to 2,3 µmol/W (spectrum dependent)
LIGHT INTENSITY DECAY: Max 10% at 36 000 h. Typical usage 50 000 h
AMBIENT OPERATING TEMPERATURE: -10 ˚C – 35 ˚C (14 ˚F – 95 ˚F)

RX- Series

LightDNA is a high-end product line of Valoya's professional LED grow lights. The purpose of the LightDNA products and solutions, is the delivery of accurate natural outdoor light conditions to indoor growing environments. Outdoor light is by default changing all the time with regards to light spectrum, intensity and photoperiod. LightDNA captures these dynamic features with precision.

TYPICAL APPLICATIONS: High intensity lighting, HID replacement
LIGHT INTENSITY IN TYPICAL APPLICATIONS: 100 ~ 1000 µmol/m2/s
DISTANCE FROM THE PLANTS: 0,5 - 4,0 m (20" - 13.1')
LIGHT EFFICACY(380 - 820 nm): 1,8 µmol/W/ 2ch & 1,8 µmol/W, varies among spectra
LIGHT INTENSITY DECAY: Max 10% at 36 000 h. Typical usage 50 000 h
AMBIENT OPERATING TEMPERATURE: 0 - 40 ˚C (32 - 104 ˚F) /2 channel & 0 - 30 ˚C (32 - 86 ˚F) / 8channel

LED light solutions

CDR introduces PHILIPS LED Grow Lights

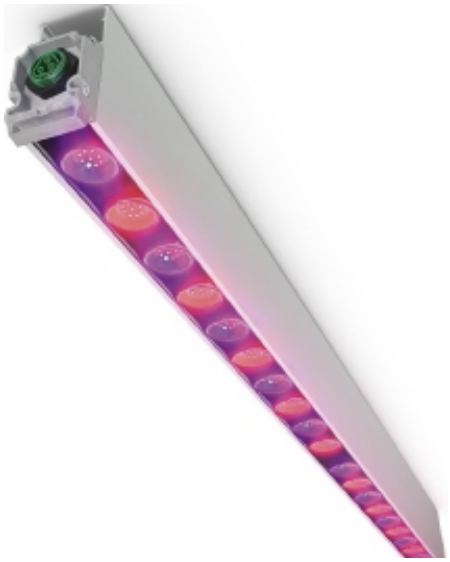
Introduction

CDR is the Greek distributor of PHILIPS LED light technology. Philips Lighting offers complete solutions designed to move greenhouse business forward. Same modules are used to grow the model plant Arabidopsis quickly and easily. It combines the unmatched LED technology with custom light recipes and the professional support of PHILIPS experienced plant specialists, account managers, application engineers and Philips LED Horti partners. Whether clients want to increase yields, move to predictable year-round production, improve quality or shorten growth cycles. These proven solutions have helped growers like you across the globe gain more control over their greenhouse climate and crops, and produce unique results that make them stand out in their markets.

PHILIPS GreenPower LED solution

GreenPower LED toplighting is a crucial ingredient in many of our project solutions. Each GreenPower LED toplighting comes with a light recipe that is designed for your crop(s) and type of growing situation. Successful projects were done in:

- High wire vegetables: tomatoes, cucumbers and peppers
- Leafy greens and herbs: lettuce and basil
- Soft fruits: strawberries
- Floriculture: cut flowers, potted plants, bedding plants, annuals & perennials
- Propagation for floriculture and vegetables



GreenPower LED toplighting delivers very high levels of light output, while radiating much less heat than HPS toplighting. That means CDR can control light and temperature separately to reach unprecedented lighting levels for your plants and improve control over your growing conditions.

Uniform crops

The advanced LED technology in our GreenPower LED toplighting delivers excellent light uniformity over your crop. This ensures uniform growth for every plant in your greenhouse to help you realize a higher return on each crop.

Product specifications

Main light colours		Deep Red/Blue types (DR/B)				Deep Red/White types (DR/W)					Deep Red/White/Far Red types (DR/W/FR)[1]			
Full light colours (channels)		LB	MB	HB	LB HO	LB	MB	HB	LB HO	MB HO	LB	MB	RSE	RSE HO
Typical photon flux	µmol/s	520	520	520	620	520	520	520	620	620	500	410	500	600
Power consumption (max.)	W	170	175	180	195	180	185	190	200	210	180	160	180	205
Efficacy	µmol/J	3.1	3.0	2.9	3.2	2.9	2.8	2.7	3.1	3.0	2.8	2.6	2.8	2.9

Legend

DR	= Deep Red	**MB**	= Medium blue
B	= Blue	**HB**	= High blue
W	= White	**HO**	= High Output
FR	= Far Red	**RSE**	= Rose
LB	= Low Blue		

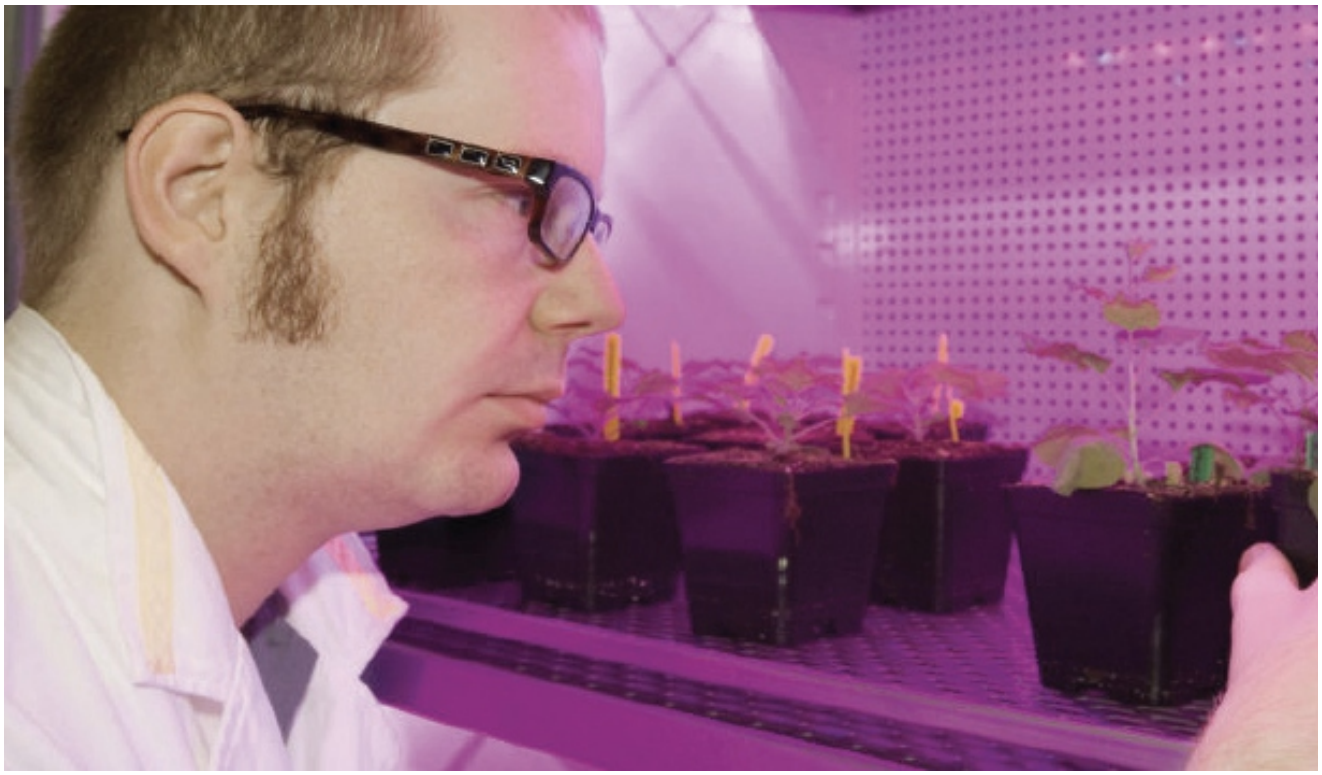
The GreenPower LED toplighting module uses passive cooling without moving parts, so it performs robustly and reliably and is easy to install. The module is designed to dissipate heat efficiently, which greatly extends its lifetime.

Convenient installation

Whether LED light installation is for a new greenhouse or for retrofitting an existing greenhouse, CDR provides the GreenPower LED toplighting module that is designed for a perfect fit and easy installation. The module can be easily mounted on a C profile which allows to position the lighting exactly where it is need it. By clicking the modules into each other with or without spaces between them, CDR ensures the right set-up for your crops.

Efficient output

Our GreenPower LED toplighting offers light output levels that typically range between 410 to 620 µmol/s per module at a very high efficacy of up to 3.2 µmol/J. That makes it a highly efficient replacement and energy-efficient supplement for traditional lighting systems.



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OMAN

G. B. PANT UNIVERSITY OF ACRICULTURE
& TECHNOLOGY
PANTNAGAR- INDIA

Bangladesh Agricultural University (BAU)

CDR CHRYSSAGIS

8 Sahtouri Str, 17341 Athens, HELLAS
tel : +30 (211) 0123852, fax: +30 (210) 9325221
e-mail: sales@chryssagis.eu & sales@chryssagis.com
http:// www.chryssagis.eu

ALBANIA
OLS-END sh.p.k
Rr. Komuna e Parisit
Pallatet TIRHINO
Kulla D, Ap 7/3, Tirana
Phone: +355 (67) 2525829
E-mail: viola.allka@gmail.com

BANGLADESH
MICRO ENGINEERING Co
Dhaka
Phone: +880 (2) 9673809
Fax: +880 (2) 9673809
E-mail: micro@axisbd.net

CYPRUS
TASNI TRADING CO LTD
57 LIDRAS FLAT 4 111 LEFKOSIA
0 NICOSIA
Phone: +357 (22) 680413
Fax: +357 (23) 87555
Website: http://www.tasni.com

EGYPT
FIRST MEDICAL INTERNATIONAL
19 Naser Al Thawra St. , El Haram,Giza
Postal Code: 12111
Phone : +0239768330
Fax : 33273036 - 39768330
E-mail: firstmedical_226@yahoo.com
Website: www.firstmedicalegy.com

INDIA
JKG Bio Science Pvt Ltd
R.O: 6D, MIG DDA Flats, Shivam Enclave ,
New Delhi-110032
A.O: 203-205, Devika Tower, Chander Nagar,
Ghazibad-201010
India
Ph: +91-120-4575127
Email: jkgbioscience@gmail.com
Website: www.jkgbioscience.com

IRAQ Scientific apparatus
Tatweer Group
Amman Regional Office
Phone: + 962 6 5546570
Fax: + 962 6 5546580
E-mail : info@tatweer.us , tatweer.mail@gmail.com
Website: www.tatweer.us

KUWAIT
Al-Arfaj Engineering Co WLL
PO Box 391, Salmiya, 22004, Kuwait
Tel : +965 2482-7934 / 2481-7944
Fax: +965 2481-7442 / 2481-7443 /2482-7894
Email: sales@arfajengg.com
Website : www.arfajengg.com

OMAN
AlAjmi Technical Supplies & Trading LLC (ATS Lab)
Laboff Middle East Office
PO Box 333, Al Maladda, Post Code 314
Sultanate of Oman
Tel: + 968 24797915
Fax: + 968 24796114
Email: laboff-me@atslaboman.com;
bmss4ats@omantel.net.om

JORDAN
Tatweer Group
Amman Regional Office
Phone: + 962 6 5546570
Fax: + 962 6 5546580
E-mail : info@tatweer.us , tatweer.mail@gmail.com
Website: www.tatweer.us

PAKISTAN
PROGRESSIVE TRADE COMPANY
Rawalpindi
Phone: +92 (51) 4413291 , 4413293
Fax: +92 (51) 4413293
E-mail: progressivetradeco@gmail.com

HELLAS

ANTISEL SA
61 P. Karatasiou Street
542 50, Thessaloniki, Greece
Phone: +30 231 032 2525
Fax: +30 231 032 1912
e-mail: antisel@antisel.gr
Website: www.antisel.com

APEROTAN TECHNIKI
Epictitou & ΖΥΓΟΥΡΗ Rd
45445 Joannina GREECE
Phone: +30 (26510) 31789
Fax: +30 (26510) 31794
e-mail: info@apeirotan.gr , diapost@otenet.gr
Website: www.apeirotan.gr

HELIODYNAMI
224, Syngrou Ave.
Scientific Devices S.A GR-176 72 Kallithea (Athens). Greece
Phone: +30 (210) 9592323
Fax +30 (210) 9581013
e-mail: info.vector@pertip.gr
Website: www.heliodynami.gr

LABOR SCIENCE SA
6, Aftokratoron Angelon Str.
GR114 73 Athens, Greece
P.O. Box 26019
Phone: +30 (210) 8848058
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CDR CHRYSSAGIS HELLAS

8 Sahtouri St. 17341 Ayios Dimitrios
Athens, HELLAS
tel : +30 (211) 0123852
fax : +30 (210) 9325221
e-mail: sales@chryssagis.eu
sales@chryssagis.com
WEB: http:// www.chryssagis.eu